CLAIMS

I CLAIM:

1. A thermal probe for use in detecting temperatures at different levels in a liquid material, comprising:

an elongated rod having a proximal end and a distal end, the distal end making initial contact with the liquid material;

a plurality of temperature-sensing junctions positioned along the longitudinal length of the rod, wherein each of the plurality of temperature-sensing junctions generates an electrical signal corresponding to the temperature of the liquid material contacting the respective junction;

a plurality of electrical signal conveying members connected to the plurality of temperature-sensing junctions and extending to the proximal end of the rod for conducting the electrical signals and conductive means for conveying the electrical signals from the proximal end of the rod to a remote signal processor.

2. The probe of claim 1, wherein the plurality of electrical signal conveying members comprise wires.

3. The probe of claim 1, wherein the rod is comprised of insulating material.

4. The probe of claim 1, wherein the distal end of the rod is tapered.

5. The probe of claim 1, further comprising:

a sheath surrounding the rod and including:

a plurality of apertures through an outer surface of the sheath and extending along the longitudinal length of the rod through which the plurality of junctions are respectively exposed to the liquid material.

6. The probe of claim 5, wherein the sheath is composed of stainless steel.

7. The probe of claim 1, wherein each of the junctions includes a thermocouple.

8. The probe of claim 1, wherein each of the junctions includes a transistor.

9. The probe of claim 1, wherein each of the junctions includes a resistance temperature detector.

10. A loading system for loading a molten material into a container comprising:

a loading arm extending from a source of the molten material for introducing the material into a container;

a valve for controlling the flow of the liquid material through the loading arm and into the container;

a thermal probe inserted vertically into the molten material and including:

an elongated rod;

a plurality of temperature-sensing junctions positioned along the longitudinal length of the rod, wherein each of the plurality of temperature-sensing junctions generates an electrical signal corresponding to the temperature of the molten material contacting the respective junction; and

a programmed processor responsive to the electrical signals from the plurality of temperature-sensing junctions operative connected to control the flow of molten material through the valve.

11. The loading system of claim 10, wherein the molten material is sulfur.

12. The loading system of claim 10, wherein the probe is attached to the loading arm.

13. The loading system of claim 10, wherein each of the plurality of junctions includes a thermocouple.

14. The loading system of claim 10, wherein each of the plurality of junctions includes a transistor.

15. The loading system of claim 10, wherein each of the plurality of

junctions includes a resistance temperature detector.

16. The loading system of claim 10, wherein a processor is programmed to include a shut-off condition when the temperature of the molten material in contact with a first junction is higher then the temperature of the molten material in contact with at least one junction positioned below the first junction on the rod.

17. The loading system of claim 16, wherein the shut-off condition includes detecting when the temperature of the molten material in contact with a first junction is greater than a predetermined set temperature.

18. The loading system of claim 17, wherein the predetermined set temperature is the average of a normal temperature of the molten material and a vapor temperature associated with the molten material.

19. The loading system of claim 10, further comprising:

a display for displaying a measurement value, the processor generating the measurement value corresponding to the level of the molten material in the container as derived from the electrical signals produced by the plurality of junctions.

20. A method controlling the loading liquid material into a container, the method comprising:

a) producing a probe, said probe comprising a rod and a

plurality of temperature-sensing junctions positioned along the longitudinal length of the rod, wherein each of the plurality of temperature-sensing junctions generates an electrical signal corresponding to the temperature of the liquid material contacting the respective junction;

b) inserting the probe vertically into the container for the liquid material;

c) admitting the liquid material into the container through a loading arm provided with a shut-off valve;

d) receiving temperature signals from the probe at a processor;

e) processing the temperature signals to determine temperature values of the liquid material at each junction of the probe;

f) determining whether a shut-off condition has occurred;

continuing to admit the liquid if the shut-off condition has not occurred;

g) repeating steps (d) through (f); and

h) closing the valve to stop the liquid flow to the container when the shut-off condition has occurred.

21. The method of claim 20, wherein the liquid material is molten sulfur.

22. The method of claim 20, wherein the step (f) includes determining that the temperature of the liquid material in contact with a first junction is greater than a predetermined set temperature, being the average of a normal liquid temperature of the

liquid material and a vapor temperature associated with the liquid material.

23. The method of claim 20, wherein the step (t) includes determining that the temperature of the liquid material in contact with a first reference junction is higher than the temperature of the liquid material in contact with at least one junction located on the rod below the first junction.